The MicroHound™:
Microsensor-Based Explosives Detection

The MicroHound provides a fast, portable, lightweight, low-cost solution for trace detection of common high explosives.

Capabilities

Sandia National Laboratories has developed the MicroHound™, a fast, handheld system for the trace detection of explosives. This lightweight (about 12 pounds) system can detect both explosives vapor and particulate. The development of the MicroHound™ was a quest to combine, in a single platform, a miniaturized sampling and preconcentration system with multiple, highly sensitive chemical microsensors that can detect nanogram amounts of explosives. The long-term goals of the project are to reduce the size, weight, and cost of a portable trace explosives detection system and use a multi-sensor platform to improve functionality. The sampling and preconcentration technology used in the MicroHound™ was originally developed and patented by Sandia for a personnel explosives detection portal. Ultimately, commercial versions of the MicroHound will be produced at a comparatively low cost (about $5K to $10K per mass-produced unit vs. $20K to $30K for current commercial handheld systems).

Features

- Trace explosives detection for common high explosives—detects sub-fingerprint quantities of explosive residue
- Hand-portable
- Integrated sampling, preconcentration, and detection subsystems into a single system package
- Multi-microsensor capabilities
- Multi-stage preconcentration

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Operation

The MicroHound™ can operate in two modes:

- contactless vapor mode, which “sniffs” the air surrounding a suspicious item, or
- swipe mode, which removes particulate from the surface of a suspicious item.

In vapor mode, the sampling unit draws in a large volume of air and collects heavy organic compounds from the air stream onto a filter. In swipe mode, the operator swipes a suspicious object’s surface and places the filter in a holder. For both modes, the system then vaporizes these compounds into a concentrated sample that is delivered to an ion mobility spectrometer (IMS) detector. If explosives are found, the unit displays an alarm to the operator.

Applications

The MicroHound™ is designed for use by the responder community to examine suspicious packages or as a tool for screening at checkpoints. A low-cost, light, effective tool would enable its use in more areas, such as courtrooms and schools, as well as in high-security, high-risk facilities and locations.

This photo demonstrates how the MicroHound could be used to detect explosives in vapor mode in a section of an airplane.

Availability

The MicroHound is currently in the engineering prototype stage and is undergoing field evaluations and continuing development of advanced capabilities. Sandia will be exploring commercialization opportunities for this technology.

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Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy’s National Nuclear Security Administration under contract DE-AC04-94AL85000.

09/26/2004

SAND2004-4802P